NAME_____

PERIOD_____ DATE_____

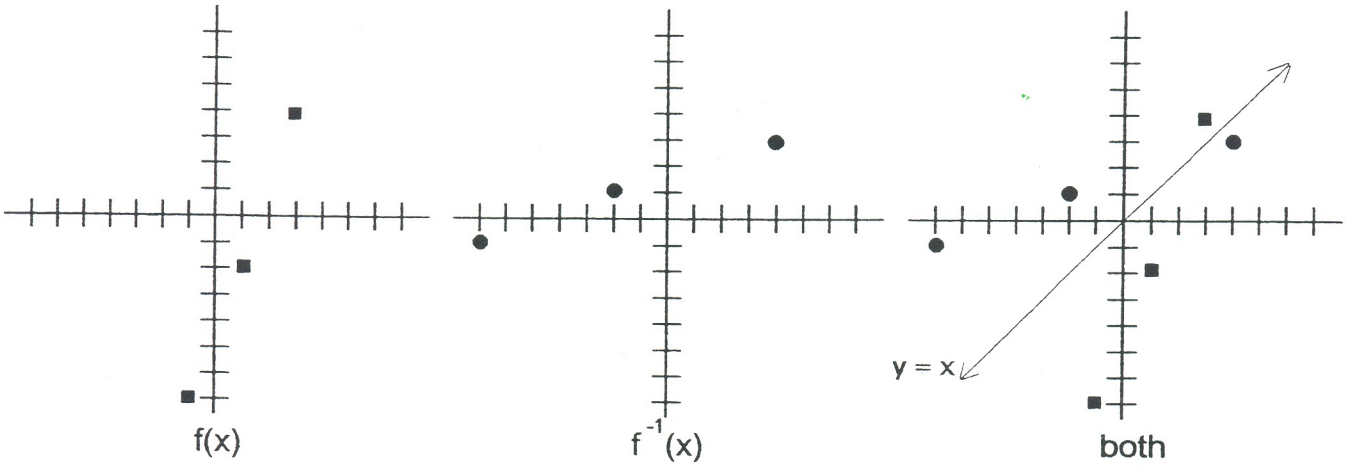
USING SYMMETRY TO FIND $f^{-1}(x)$

From our discussion of functions and their inverses, we have come to the conclusion that to find the inverse of f(x), simply exchange the roles of x and y. For example, (1,4) becomes (4,1) and y = 3x + 5 becomes x = 3y + 5. Graphically, this presents some interesting results.

Let f(x) = {(1,-2), (3,4), (-1,-7)}

Thus $f^{-1}(x)$ = {(-2,1), (4,3), (-7,-1)}

Let's look at their corresponding graphs.



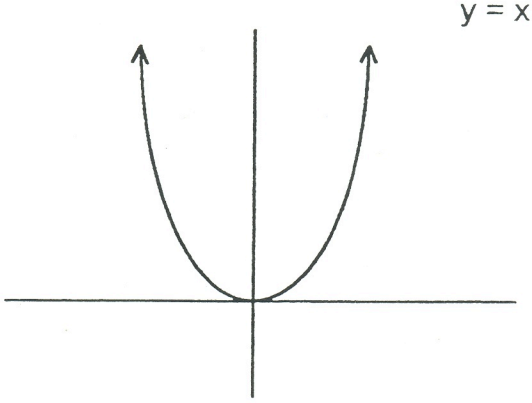
Notice that the midpoint of each point and its inverse point lies on the line y = x.

(1,-2) and (-2,1)	have a midpoint of	(-1,-1)
(3,4) and (4,3)	have a midpoint of	(3½,3½)
(-1,-7) and (-7,-1)	have a midpoint of	(-4,-4)

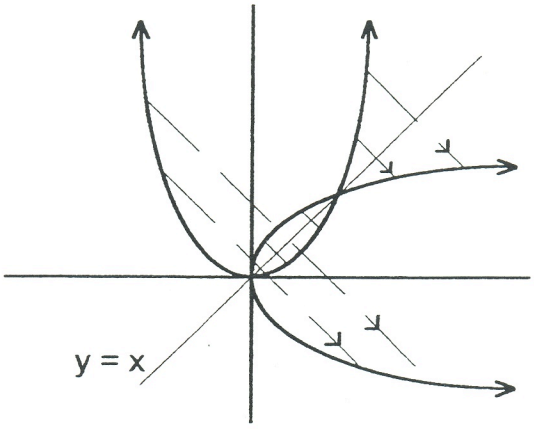
Thus, a point and its inverse are symmetric to the line y = x. We can use this observation to help us graph the inverse of a function.

Consider the following function.

$y = x^2$



For each point on this graph, we can find its inverse point by plotting a point symmetric to it across the line $y = x$.



And, the result is the graph of the inverse function.

$x = y^2$